**Individual Project due 24:00 October, 2012 (to be loaded onto your wiki).**

**Name:** Madhavi

Project - Thin client network for a small school using Recycled PC as thin client <$100



The project could concentrate on installing a thin client network for a small school with solar panels, gel batteries, inverter and a small network of 20 desktop PC’s which may include a server, printer and other necessary equipment. The proposed network provides service to a classroom that has fluorescent lighting. Classes operate between the hours 8.30am to 3.30pm (7.00 hours)

Assumptions:

• The existing computer network is ON 5 days per week 24 hours per day

• The existing classroom lighting is ON 5 days per week 10 hours per day

**Individual Project**

1. Negotiate with the stakeholders to establish the extent to which sustainability is to be integrated

Answer:

Sustainability conditions include:-

* Recycled P4 PC will be using as a thin client this will be giving high running cost.
* This pc costs is 60$ /per pc
* But it will increase a cost of power usage and running cost

Thin client need to be run faster and power usage must be lesser

* Can be improved by replacing the actual power board inside the pc4.
* Installing USB power monitor system with monitoring software.
* Support for non-functioning equipment will not be sort. This equipment will be environmentally disposed of and new energy efficient thin clients will be purchased and put into the business.
* It is understood with the server now running all the software required for the school then the IT support costs will become lower as there will be less required visits to individual workstations to fix various problems. This expected saving in the budget will be put aside a used to fund the replacement equipment described earlier.
* By using the energy management software can be organise for working times and shutdown times.
* School hours only from 8:30 am to 3:30 pm, after this hours all the equipment will be shutdown automatically by using software.

**Hardware**

□ renewable energy source

□ low powered hardware

□ energy efficient architecture

Summary: My Individual Project uses ….

**Software**

□ energy management software

<http://en.wikipedia.org/wiki/Energy_management_software>

<http://www.energylens.com/>

<http://buildaroo.com/news/article/serious-materials-energy-management-software-commercial/>

There is plenty of softwares in market but, I have choose serous Energy software.

It is easy to use.

**Energy Management Software** (**EMS**) is a general term and category referring to a variety of energy-related software applications which may provide utility bill tracking, real-time metering, building HVAC and lighting control systems, building simulation and modeling, carbon and sustainability reporting, IT equipment management, demand response, and/or energy audits. Managing energy can require a system of systems approach[[1]](http://en.wikipedia.org/wiki/Energy_management_software" \l "cite_note-0).

Energy management software often provides tools for reducing energy costs and consumption for buildings or communities. EMS collects energy data and uses it for three main purposes: Reporting, Monitoring and Engagement. Reporting may include verification of energy data, benchmarking, and setting high-level energy use reduction targets. Monitoring may include trend analysis and tracking energy consumption to identify cost-saving opportunities. Engagement can mean real-time responses (automated or manual), or the initiation of a dialogue between occupants and building managers to promote energy conservation. One engagement method that has recently gained popularity is the real-time energy consumption display available in web applications or an onsite energy dashboard/display.

**DATA collection**:

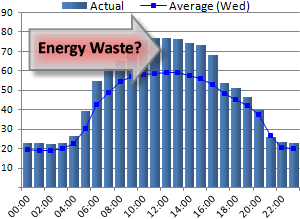
Historic and/or real-time interval data, with intervals varying from quarterly billing statements to minute-by-minute smart meter readings. The data are collected from interval meters, [Building Automation Systems (BAS)](http://en.wikipedia.org/wiki/Building_automation), directly from utilities, or other sources. Past bills can be used to provide a comparison between pre- and post-EMS energy consumption.

Electricity and Natural Gas are the most common utilities measured, though systems may monitor steam, petroleum or other energy uses, water use, and even locally generated energy.

Serious Energy software help [commercial](http://buildaroo.com/market/commercial/) buildings make the most of their energy resources, Serious Materials announced last Monday the release of their energy management [software](http://buildaroo.com/green-building/green-building-products/software/), known as SeriousEnergy Manager. This energy management software can utilize historical information about a building combined with current energy usage to help [commercial](http://buildaroo.com/market/commercial/) building managers analyze the building's energy use and pinpoint areas where they can reduce power consumption. Since "smart grid" technology is becoming a standard in many homes, [estimated to reach 28 million by 2015](http://buildaroo.com/news/article/home-energy-management-users-will-reach-28-million-by-2015/), commercial properties are taking the cue, and companies like Serious Materials say they can help shave 5 to 15% off power bills once their energy management software is installed.

The Serious Materials SeriousEnergy Manager has plenty of competition, with even NASA working with companies to develop [energy management software](http://buildaroo.com/news/article/nasa-to-develop-automated-building-energy-monitoring-management-systems/). Serious Materials CEO Kevin Surace said the SeriousEnergy Manager software gives their customers "the ability to manage, analyze, and maintain real energy savings on an ongoing basis." Unlike other energy management software packages, the SeriousEnergy Manager focuses more on optimizing energy usage rather than simply monitoring the current level. Serious Materials claims one of their customers has already cut their energy use 18% with their SeriousEnergy Manager energy management software





**Printing**

□ local

Making sure to avoid Local Printing in the building

All staff and students should be educated for how can avoid local printing and wasting paper and minimise energy.

Current colour printing is minimal with an ink jet printer approx. 2 years old. This printer is to be disposed as the current costs are unacceptable and all colour printing to be out sourced.

A review at the end of life for the current mono printer will take place as to the purchase of a colour/mono printer option.

□ online

□ to Pdf/wiki

Try to improve your knowledge to use online version for submitting project work and

Saving documents .

2. Advise short term technology solutions to achieve reduction of power consumption

Answer:

* Fix low Kilo watt range lighting equipments in the building.
* Install energy management software to cut of power usage.
* Most industries are responding to increased energy costs and limited energy supplies by adopting a series of conservation measures. These measures will often reduce work, thus saving money by reducing energy consumption. Conservation -- using the same amount of energy to perform more work -- may also improve efficiency. Taken together, these measures are dubbed "going green."
* Installing solar pannels

3. Identify energy usage within the scope of the ICT project and provide a detailed report

Used approximate from class work

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Condition** | **PC power consumption**  **(watts)** | **WEB client** | **Thin client**  **Y100** | **Server** | **Notes** |
| **OFF** | 21 | .27 | .3 | 19 |  |
| **MAX BOOT** | 51 | 5.1 | 3.5 | 42 |  |
| **IDLE** | 42 | 3.4 | 3.2 | 42 |  |
| **Wordprocessing** | 46 | 5.1 | 3.3 | 44 |  |
| **Spreadsheets** | 46 | 5.1 | 3.3 | 44 |  |
| **Web browsing**  <http://news.bbc.co.uk/2/hi/programmes/click_online/default.stm> | 55 | 4.6 | n/a | n/a |  |
| **Low level music**  <http://grooveshark.com/#/s/Fall+At+Your+Feet/3KIZB0?src=5> | 44 | 6.7 | n/a | n/a |  |
| **Low level video**  <http://www.joost.com/39w1yk49/#/?video_info=33p1yw1t> | 57 | 5.2 | n/a | n/a |  |
|  |  |  |  |  |  |

NOTE: power consumption used as a reference from class activity

**PowerPoint Presentation**

Create a PowerPoint presentation of your individual Project with the following slides:

1. The Basics of preparing to integrate sustainability into ICT planning and design projects;
2. ICT sustainability from a business standpoint;
3. Energy efficiency as a stepping stone to sustainability;
4. Individual Project Strategy
5. Network operation and security;
6. Sketch of the recommended project system;
7. Test results
8. Short term technology solutions to achieve reduction of power consumption;
9. Energy usage within the ICT project - graph
10. Recommendations and Conclusion.

**Individual Report**

**For your individual project answer the following:**

1. Explain how sustainability can be integrated into your individual Project

Workstation replacement will bring usage of low power and can bring down usage by using through USB power plugs and smart power management software.

Printer usage: implement most of the printing not use manual paper, can be used as soft copy or offsite printing. If need use paper printing use as a both side .by using soft copy printing and email system can be avoid wastage of ink and power and paper.

1. Research and identify suitable technology solutions applicable to the project

Thin Clients can be powered through the USB power and Ethernet cable also connects it to the network. This helps in setup costs. the configuration makes easy . Thin Clients will be all in one system which include Monitor and PC with network.

1. Explain the power consumption data compared to benchmarks

The reduction in power from the P4’s to the HP t410 all-in-one is 30 watts during usage and more in standby mode.

The benchmark for the server is the current workstation which is being used as a server. The upgrade to a dedicated server is required for security and management purposes. Its power usage is dramatically higher but this will be offset by the solar panels installed.

The switches power usage does not have a comparable benchmark as can be found in the figures below. Power usage is expected to rise to a maximum indicated in the ‘recommended actions’ column once all current P4’s have been replaced

1. Advise how sustainable management principles may be applied to your individual project resulting in reduced environmental impact

The proposed printer will have an immediate impact on costs to run and on the environment. Using half the paper and bio friendly inks have an effect which benefits the planet.

Over time as the Pc4’s are replaced with low wattage devices the solar panels could in fact eventually supply all the power to run the HP T410. Reinvesting the savings made through change could see the solar panels expanded and the business can then perhaps become self-efficient for its power.

1. Provide key performance indicators (KPI) - sustainability performance for your individual Project

**Key Performance Indicators**

|  |  |  |  |
| --- | --- | --- | --- |
| **Hardware** | **SD-KPI 1: Energy / greenhouse gas efficiency of production / products in use**  **(tons CO2)** | **SD-KPI 2: Proportion of products with “Design for Environment” / Eco-Label**  **(√)**  **or (x)** | **SD-KPI 3: Emissions of (hazardous) waste and toxic materials**  **Yes or No** |
| HP ProLiant DL380 G7 Server | 375w\*24\*5\*52 \*6.89560/10000  = 1613.57 | Energy Smart | No |
| HP t410 All-in-one | 13w\*8\*5\*52 \*6.89560/10000  = 18.65 | ENERGY STAR® qualified  EPEAT ® Gold registered | BFR/PVC free materials |
| Hewlett Packard HP Color Laserjet CM 6040 F MFP | 36w\*3\*85\*52 \*6.89560/10000  = 329.17 | EC ENERGY STAR | Yes – Non-toxic Ink |
|  |  |  |  |
|  |  |  |  |

1. Advise what actions could improve the KPI’s for your Individual Project which foster sustainability and environmental best practice

Out sourcing of the printing will reduce the hours the printer is not in standby mode thus reducing power consumption that along with its non-toxic inks which fit environment best practice guidelines. The ink usage would also be reduced saving money.

The HP t410 All-in-one units have a very low standby power usage, but that coupled with a timer that ceases all power overnight will see more savings in power usage.

<http://www.myshopping.com.au/PT--2_Desktop_Computers?Find=hp%20t410%20all-in-one>

1. Evaluate the estimated CO2 emissions with comparable benchmarks; and
2. Estimate the carbon dioxide (CO2) emissions for the Individual Project; and Individual Project + Recommended Actions

http://www.ebay.com/sch/i.html?\_trksid=p5360.m570.l1313&\_nkw=HP+P4+pc&\_sacat=0&\_from=R40

|  |  |  |  |
| --- | --- | --- | --- |
| **Hardware** | **Benchmark**  **(tons CO2)** | **Individual Project**  **(tons CO2)** | **Individual Project**  **+**  **Recommended Actions**  **(tons CO2)** |
| Recycled pc /Hp PC4 | 24w\*8\*5\*52 \*6.89560/10000  = 34.42 | 24w\*8\*5\*52 \*6.89560/10000  = 34.42 | 13w\*8\*5\*52 \*6.89560/10000  = 18.65 |
| HP ProCurve (J4904A) 48-Ports External Switch | Tested with only 2 ports  8w\*24\*5\*52 \*6.89560/10000  = 34.42 | 102w\*24\*5\*52 \*6.89560/10000  = 438.89 | 282w\*24\*5\*52 \*6.89560/10000  = 1213.4 |
| Hewlett Packard HP Color Laserjet CM 6040 F MFP | 42w\*24\*5\*52 \*6.89560/10000  = 180.72 | 375w\*24\*5\*52 \*6.89560/10000  = 1613.57 | 375w\*24\*5\*52 \*6.89560/10000  = 1613.57 |

1. Make recommendations in order of priority and give estimates of implementation costs on integration of sustainability for other ICT projects; and
2. Estimate potential energy savings and payback periods for recommended actions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Recommendation** | **Priority** | **Implementation Cost** | **Energy Saving** | **Payback Period** |
| HP ProLiant DL380 G7 Server | High | $2,751:00 | -300 +watts | Pay back in business security |
| HP t410 All-in-one  desktops | Low | $350:00 \*20= $7000 | 30 watts |  |
| HP ProCurve (J4904A) 48-Ports External Switch | High | $599 | Varies due to amount of PoE devices | Very good for bussiness |
| HP M9040 jet printer | Medium | $1400:00 | 11w in standby |  |

Power and performance comparison of the DL380 G7 server in Dynamic Power Savings mode (slow and fast response time) and Static modes (Low Power and High Performance)

Power Regulator mode comparisons under different CPU utilization (performance) loads using the two-processor DL380 G7 server with Quad-core Intel Xeon 5670 2.93-GHz processors. At loads under 70% of the maximum performance, Static Low Power mode uses up to 8% less power than Static High Performance mode to provide the same performance. Figure 2 also shows that Dynamic Power Savings mode (slow response) uses the entire CPU performance range like Static High mode, but provides the same power savings as Static Low mode.